

# A Prominence/Filament Eruption Triggered by Eight Homologous Flares



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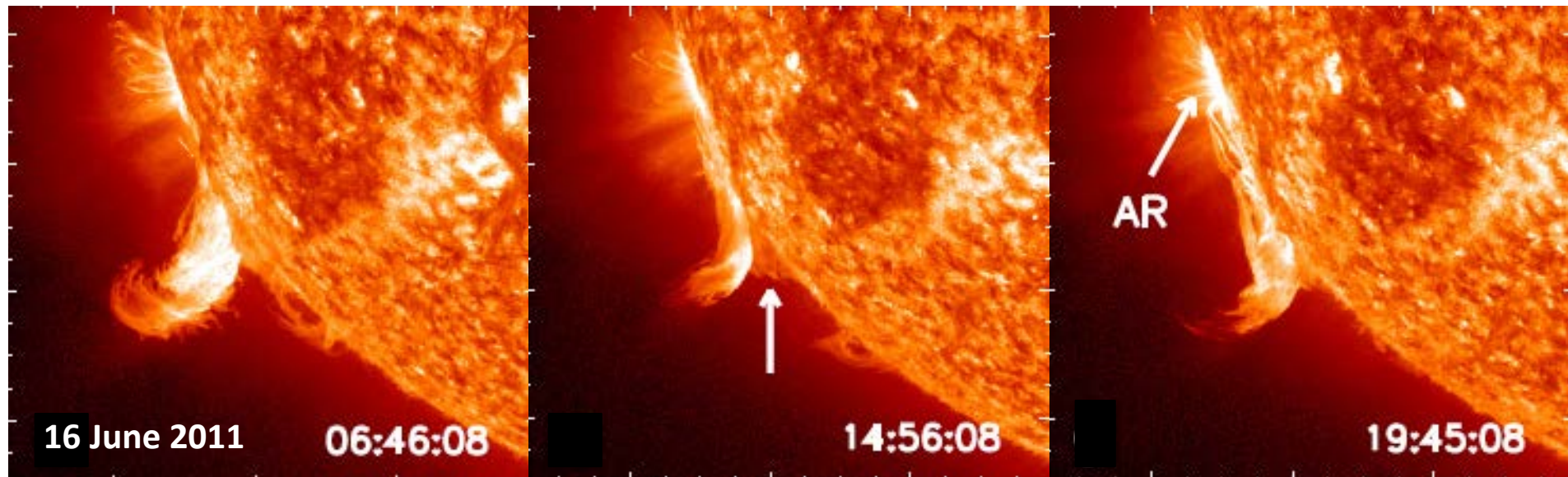
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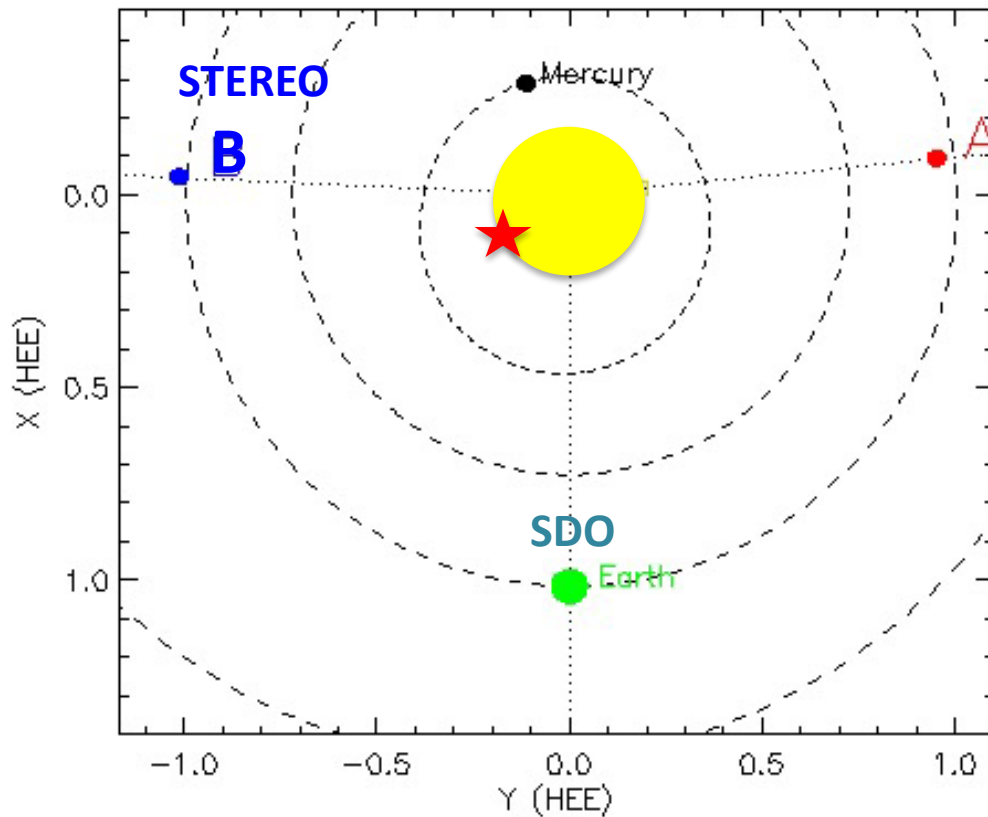
## Homologous flares

- A series of solar flares that occur repetitively from the same active region, with similar shape and morphology.
- It is an important phenomena for studying the conditions of the flare trigger processes.

SDO/AIA HeII 304Å



## Position of SDO and STEREO-A on 16 June 2011

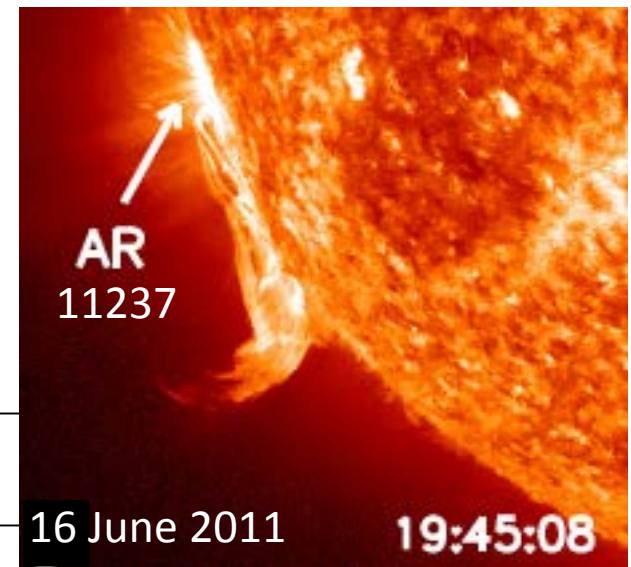
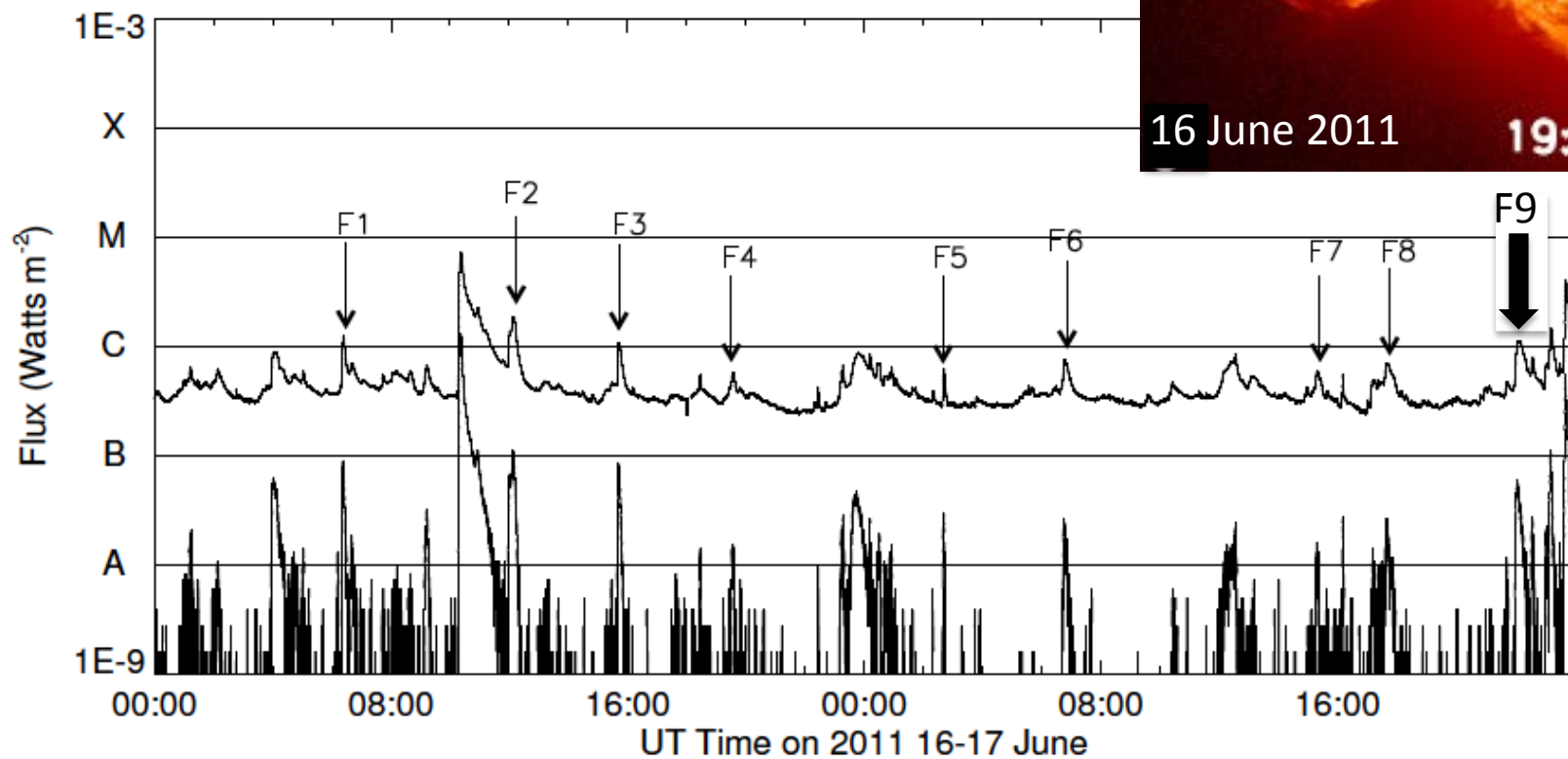


- **SDO**      HeII 304,  
FeIX 171, and  
FeXII 193 Å
- **STEREO-B**      HeII 304, and  
FeXII 195 Å

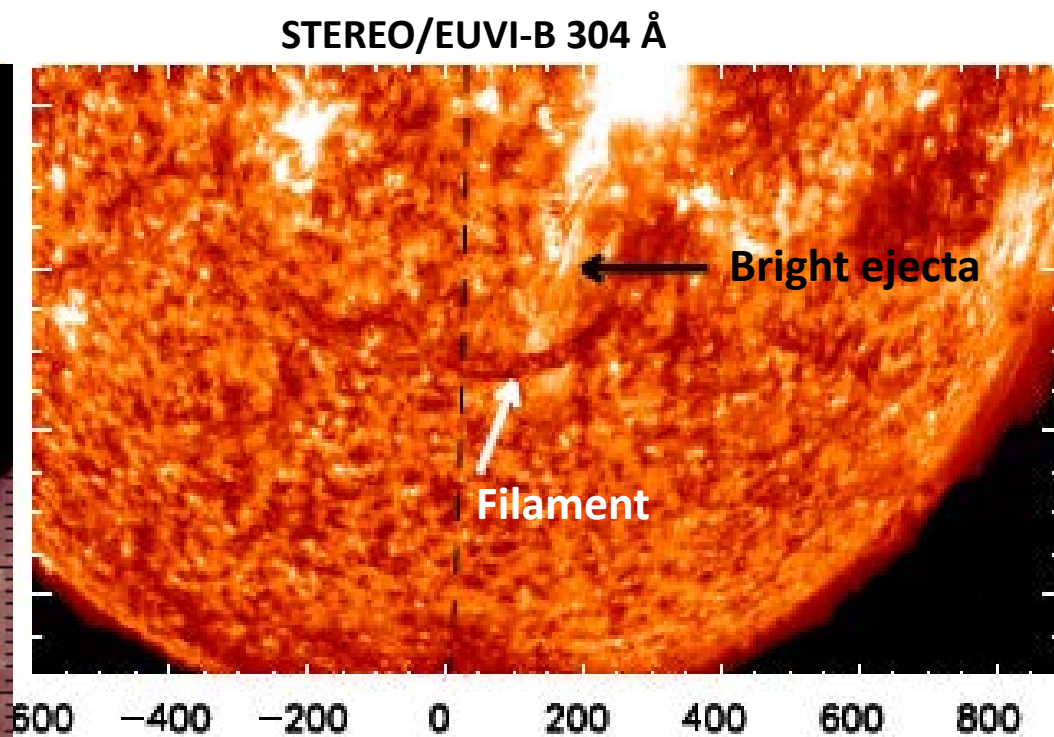
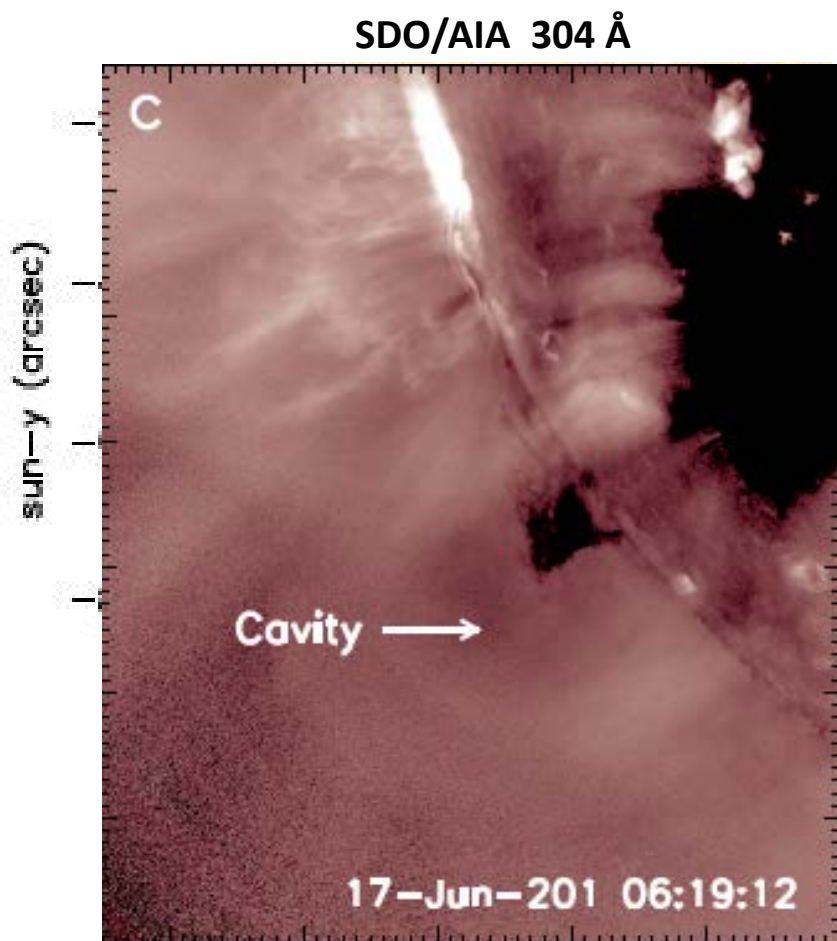
- The separation angle between SDO and STEREO-B was  $92^\circ$



## GOES soft X-ray flux from 16 to 17 June 2011



## Active region and prominence/filament cavity system (PFCS) on 17 June 2011

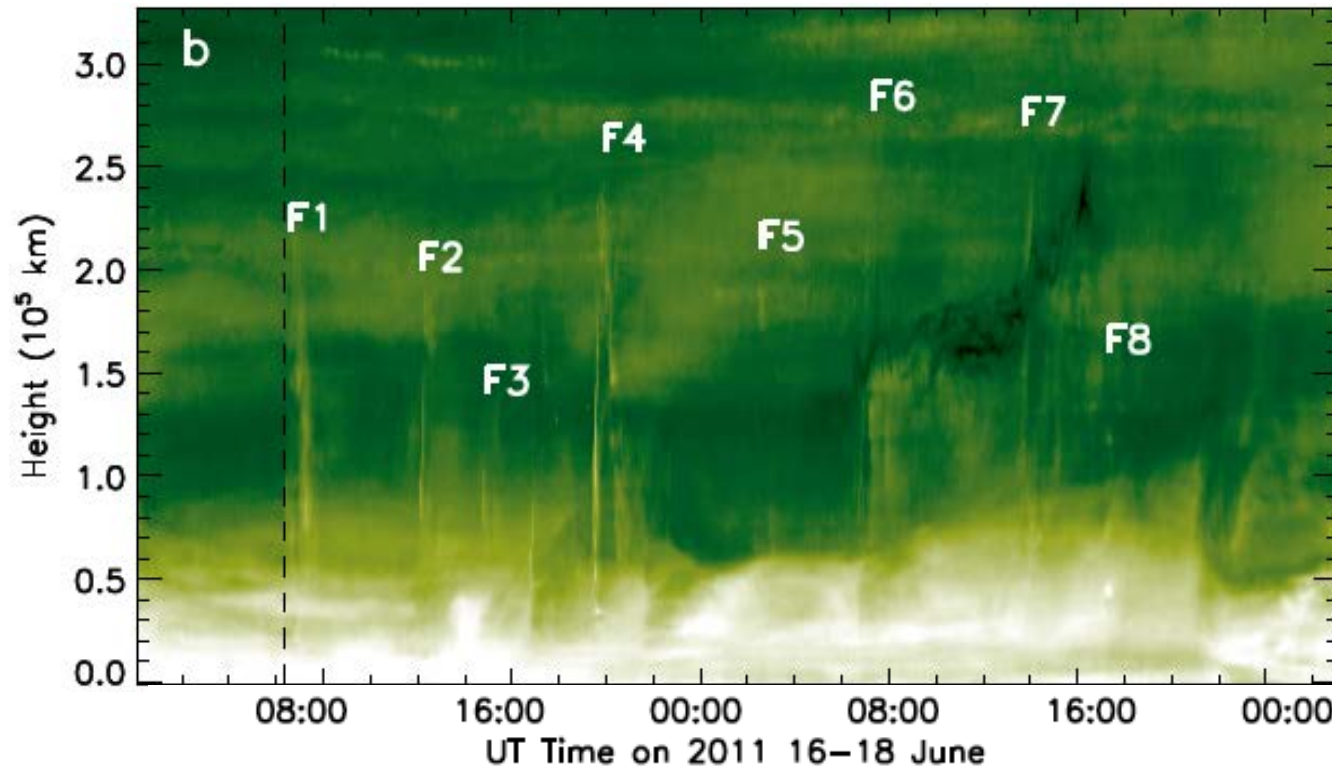
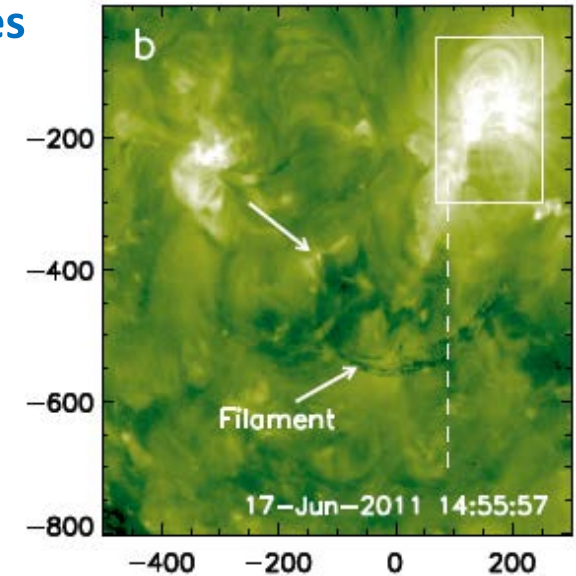


**The eight homologous flares were observed by SDO/AIA from 16 to 17 June 2011**

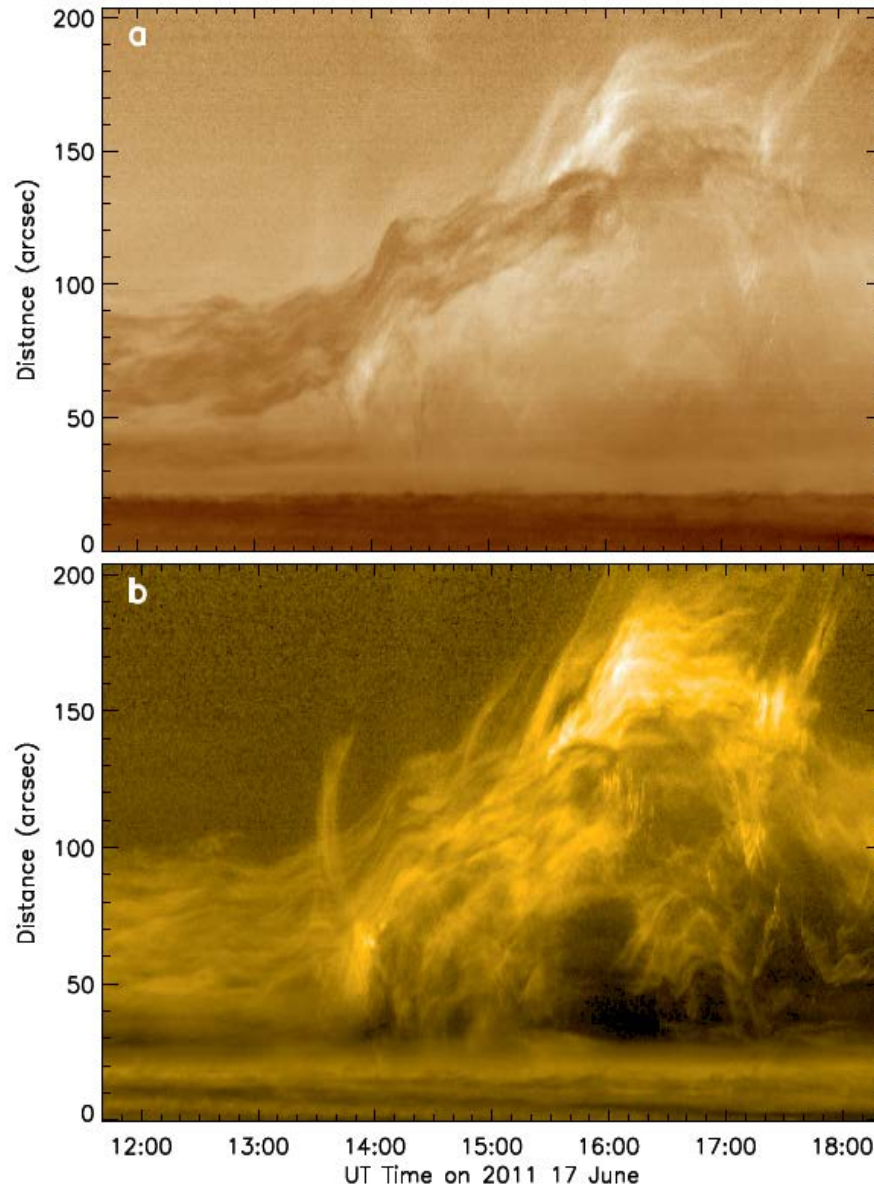


## Prominence/filament trajectory during a series of eight flares

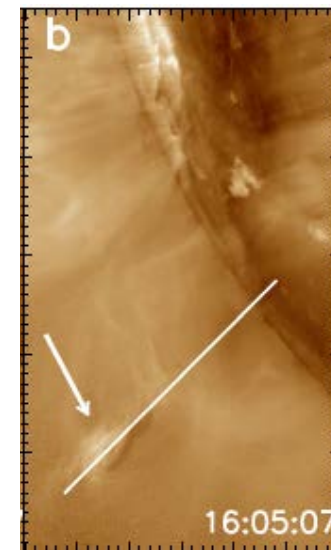
- The prominence starts to rise after F4, F6 and F7.
- The prominence moves with an average velocity of  $\sim 1 \text{ km s}^{-1}$  during its slow-rise phase.
- During the fast-rise phase it moves with an average velocity of  $\sim 4 \text{ km s}^{-1}$ .



## Confined prominence eruption on 17 June 2011



SDO/AIA 171 Å



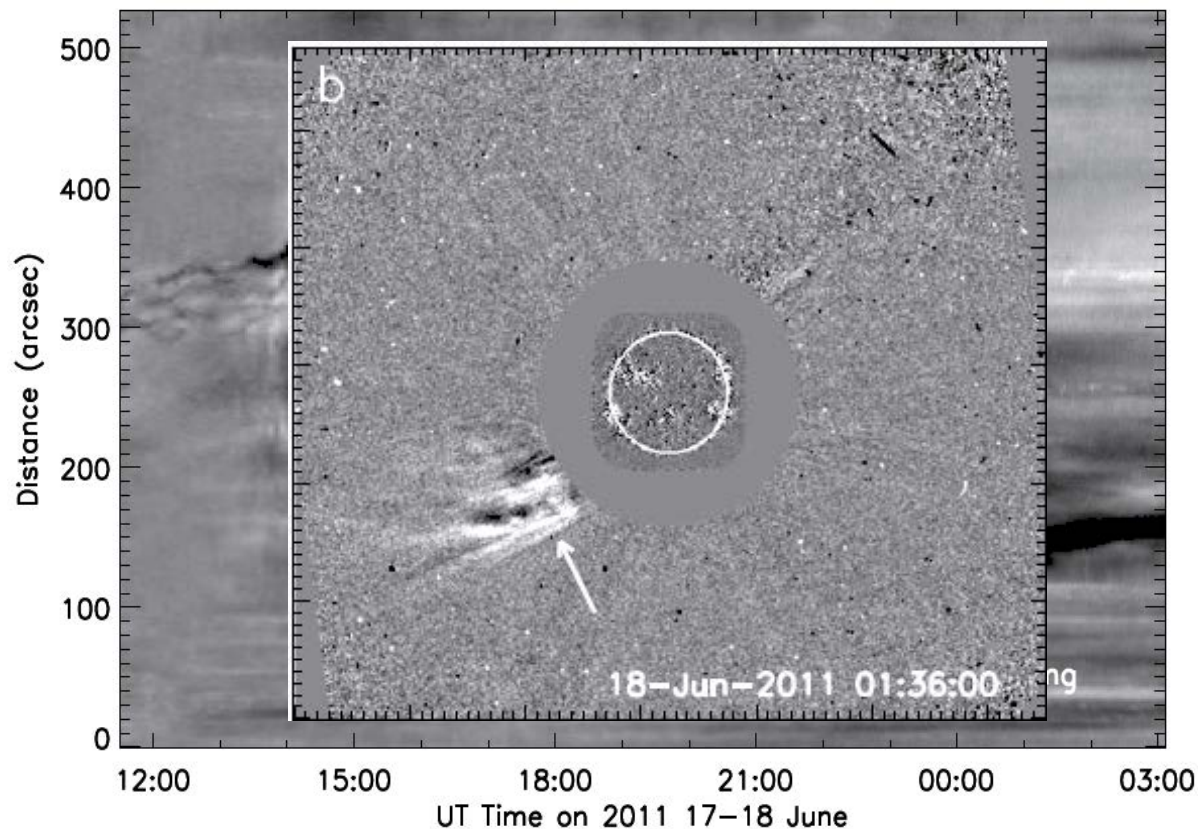
- Upward motion of the prominence starts at 13:50 UT.
- Strong downflows appear in 171 and 193 Å images after the brightening at the top.



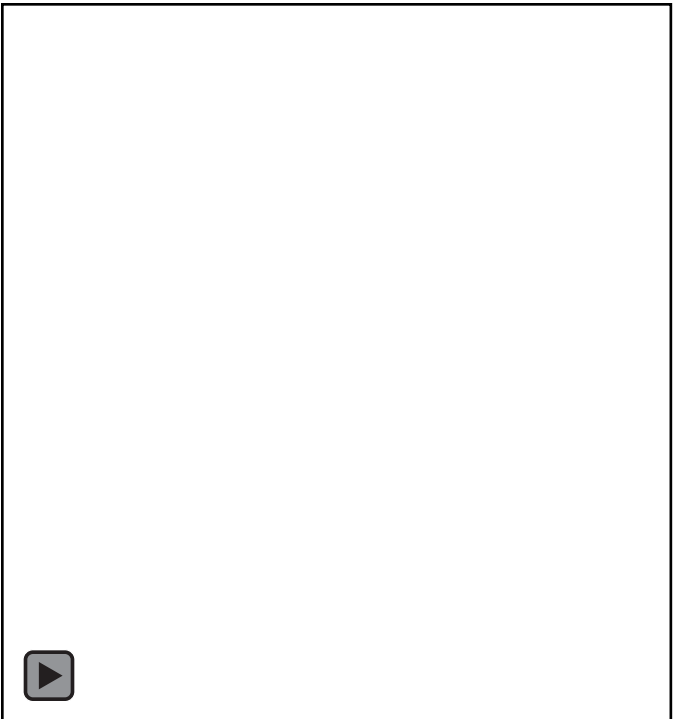
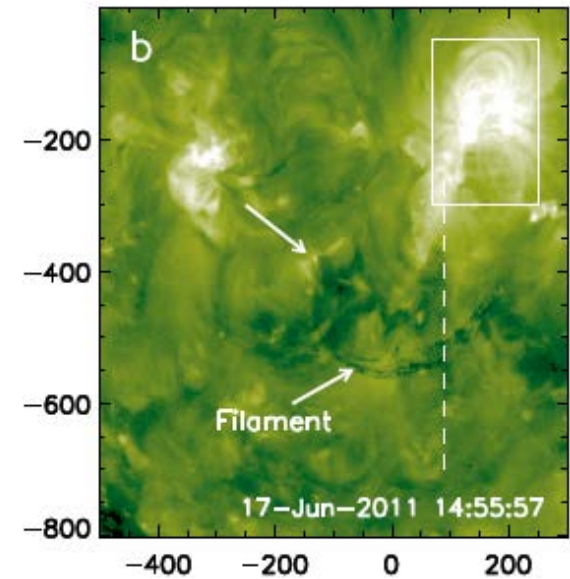


## Coronal dimming and the CME

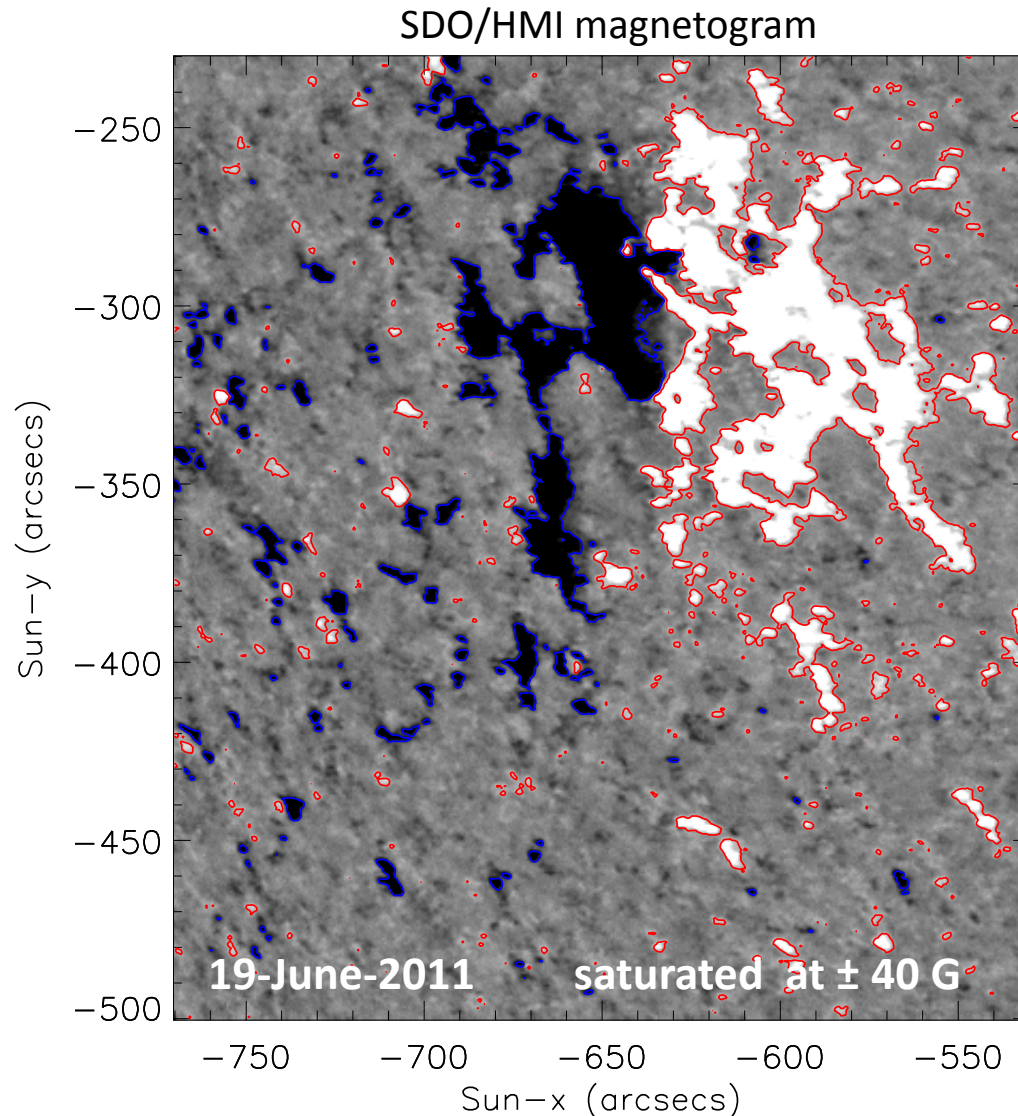
- The overlying field of the PFCS started to expand after the filament eruption.
- They completely open with the last flare F9 leading to a strong dimming and the CME.



STEREO/EUVI-B 195 Å

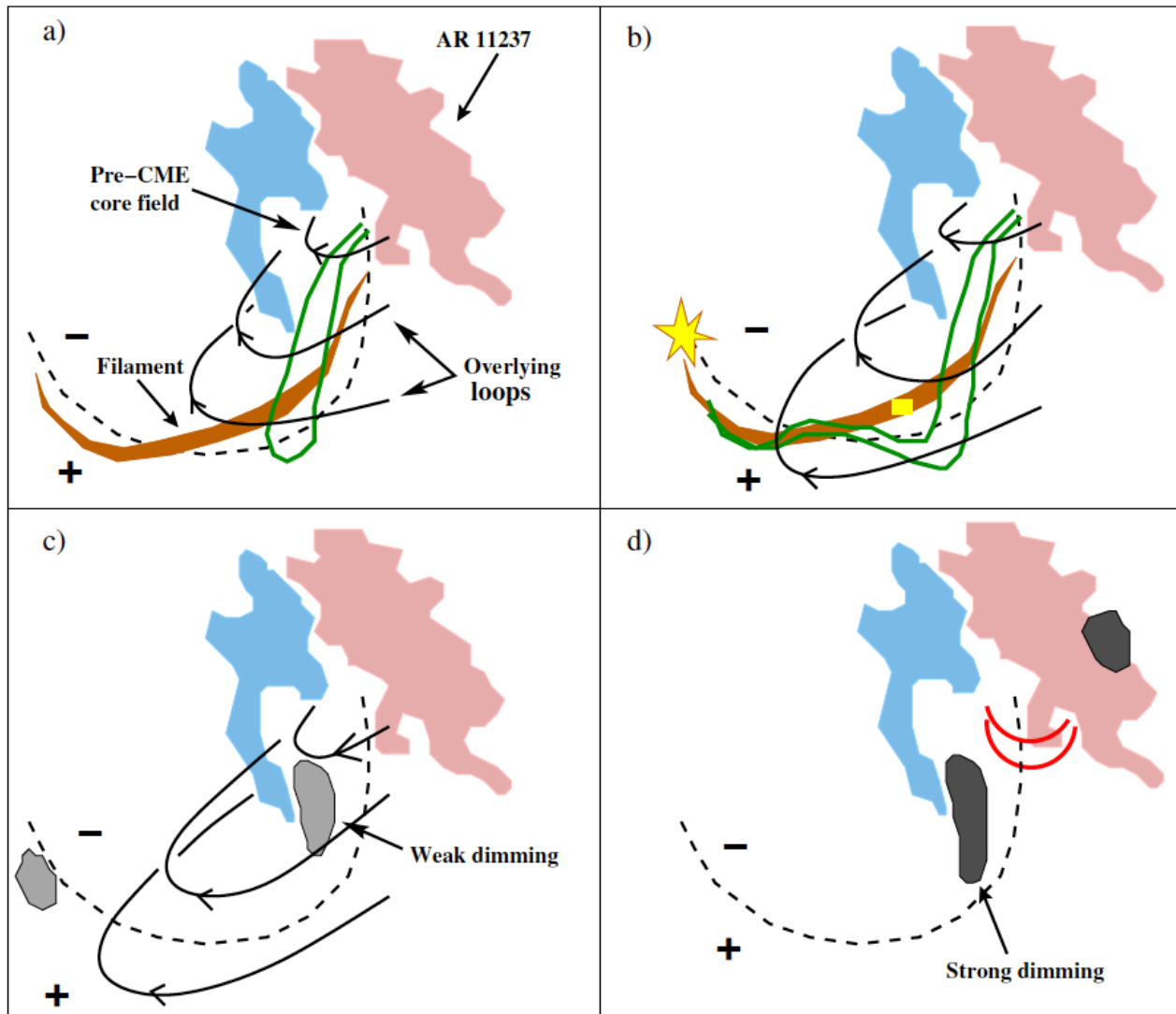


## Magnetic structure of the active region and filament on 19 June 2011



The blue and red contours represent negative and positive magnetic flux, respectively.

## Schematic illustration of observations



- The PFCS was disrupted after F8 flare.
- The field containing the PFCS started to erupt slowly.
- This process removed the overlying field above the active region, which confining the F1-F8 flares.
- The final ejective flare occurred from the core of the active region, followed by the dimming and CME.



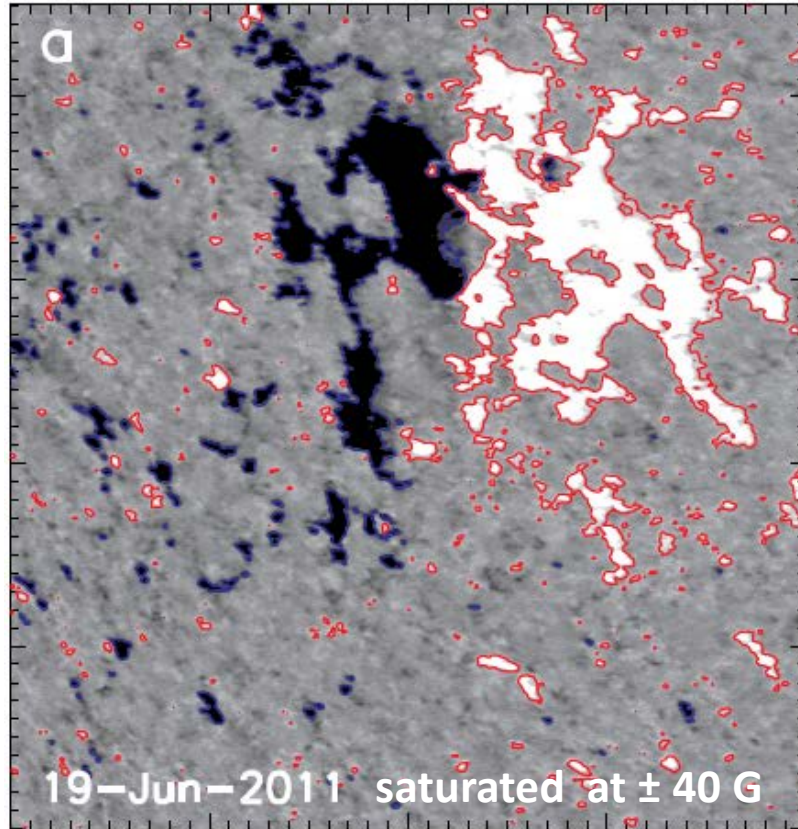
## Summary

- The eight homologous eruptions continuously disrupted the prominence/filament cavity system (PFCS).
- All the eight eruptions were mainly confined. The eighth eruption triggered the PFCS to move outward.
- A final ejective eruption occurred in the core of the active region after the removal of overlying field of the PFCS.
- Simultaneously, a strong coronal dimming occurred and a CME was expelled from the region.
- A plausible scenario is that the eight homologous flares gradually destabilized the PFCS, this destabilization removed the field above the active region, leading to the ejective flare and the CME via the 'lid removal' mechanism ([Sterling et al. 2014](#)).

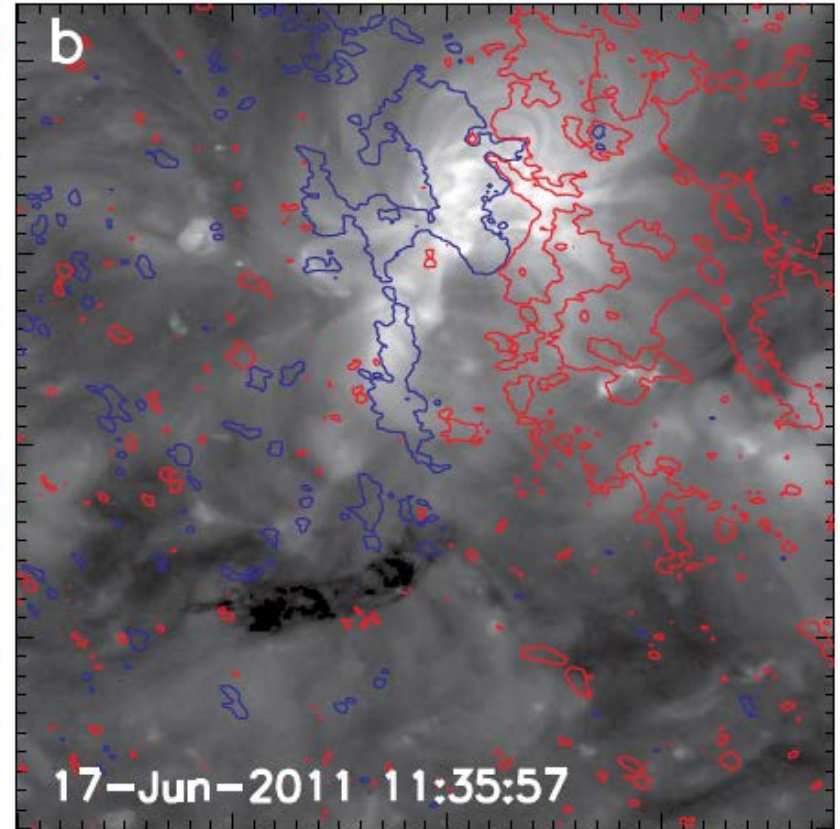


## Magnetic structure of the active region and filament on 19 June 2011

SDO/HMI magnetogram



STEREO/EUBI-B 195 Å



The blue and red contours represent negative and positive magnetic flux, respectively.

